

Calculations of the flow rate for the air bearing skis in Hyperloop Alpha

[Hyperloop Alpha](#)

Pressure to skis kPa	11 P
Tube temp K	298 T
Gas Constant	8314 R
Gas Mol Wt (air)	28.97 M
Heat cap ratio (air)	1.4 G gamma
Gas density Kg/m ²	0.12862 Density = MP/RT
Speed of sound m/s	346 Speed = (GRT/M) ^{.5}

Alpha mass flow rate kg/s	0.200
Alpha vol flow rate M ³ /s	1.555

Number of skis	28
Length M	1.5
Width M	0.5
Length of edges M	112
Slot width mm	1.3
Total exit area m ²	0.1456

Alpha slot exit velocity m/s	10.68
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Pressure under ski kPa	11.00
Pressure outside kPa	0.10
Pressure ratio	110
Local speed of sound m/s	346
Estimated exit velocity m/s	346

The speed is Mach 1 because the flow is choked.

Flow becomes choked for air for pressure ratios above 1.9

[See Choked Flow](#)